

Rising from the Ashes:

Designing an Advanced Mobile Emergency Communication Vehicle based on lessons learned from BC Wildland-Urban 2003 Interface Fires

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**Disaster Communications
Research Background**

SFU Disaster Communications Research Background

Policy Research

- Telecommunications, broadcasting, information policy studies
- Emergency communications - critical infrastructure, interoperability, vulnerability, needs evaluations, regulation, industry & end-user interaction, technology transfer

SFU Disaster Communications Research Background

Applied Research

- Emergency Preparedness Information Exchange (EPIX)
- Virtual Emergency Management Information Systems

Internet Gopher Information Client v2.0.16

Emergency Preparedness Information eXchange (EPIX)

- > ■
1. About EPIX (READ ME FIRST)/
 2. EPIX World Wide Web Server
 3. International Decade for Natural Disaster Reduction/
 4. Emergency/Disaster Management Organizations/
 5. Emergency/Disaster Management Topics/

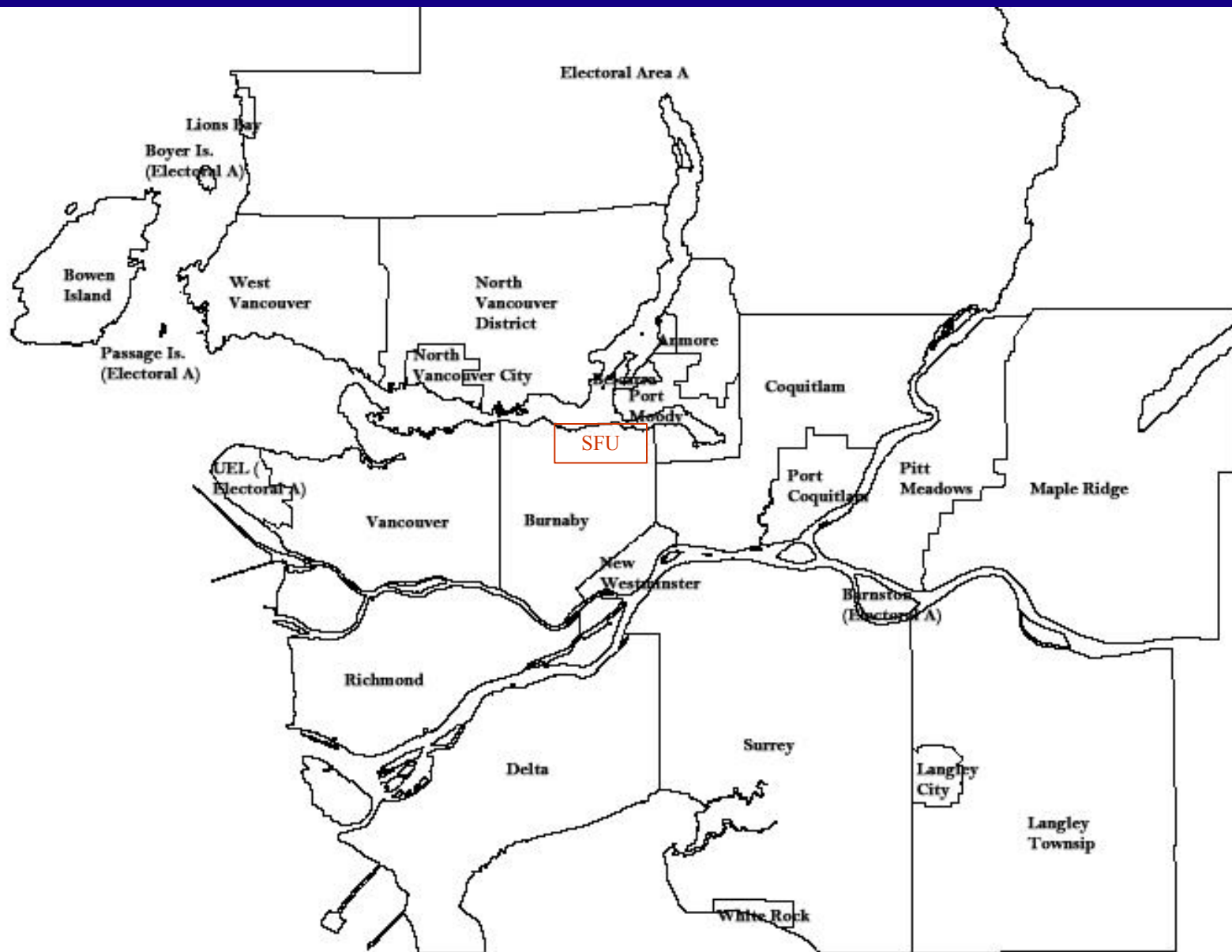
Emergency Preparedness Information Exchange (EPIX)



SFU Supported Projects ...

Disaster Management Support

- 1993-2003 - Internet gateway/distribution of UN - OCHA disaster sitreps and appeals
- 1994 - Mirror site for California EDIS system during Northridge Earthquake relief and recovery operations
- 1997 - Manitoba Red River Floods - Internet site support for Emergency Preparedness Canada
- 1998 - Salmon Arm Wildland Fire - Internet site support for BC Provincial Emergency Program
- 1999 - 2002 British Columbia Floods - Internet site support for BC Provincial Emergency Program and emergency email distribution
- 2003 British Columbia Wildland-Urban Interface Fires - Internet site support for BC Provincial Emergency Program and satellite communications support for BC Forestry Service





SFU Supported Radio Projects

Host site for:

- VHF/UHF community amateur radio club repeaters
- Amateur television repeaters
- Packet radio & APRS Internet gateways
- WinLink 2000/Telpac Internet gateway
- Search and rescue repeaters

Virtual Emergency Management Information Systems



Objective:

During crises - to enable emergency managers to remain in critical decision-making processes regardless of physical location

Virtual Emergency Management Information Systems



Technology

- Integration of fixed and mobile wireless and wired systems
- Building on common infrastructure with focus on interoperability
- Using IP as a common bridging protocol

Virtual Emergency Management Information Systems

VEMIS

Initial Wireless Internet Component 1995 - 2000



- 56 kbps UHF TCP/IP wireless system
- behaved like a slower speed version of standard Ethernet system used in most offices



Virtual Emergency Management Information Systems

VEMIS

High Speed Wireless Backbone/Testbed

- Currently moving up to 50 Mbps



Firestorm 2003

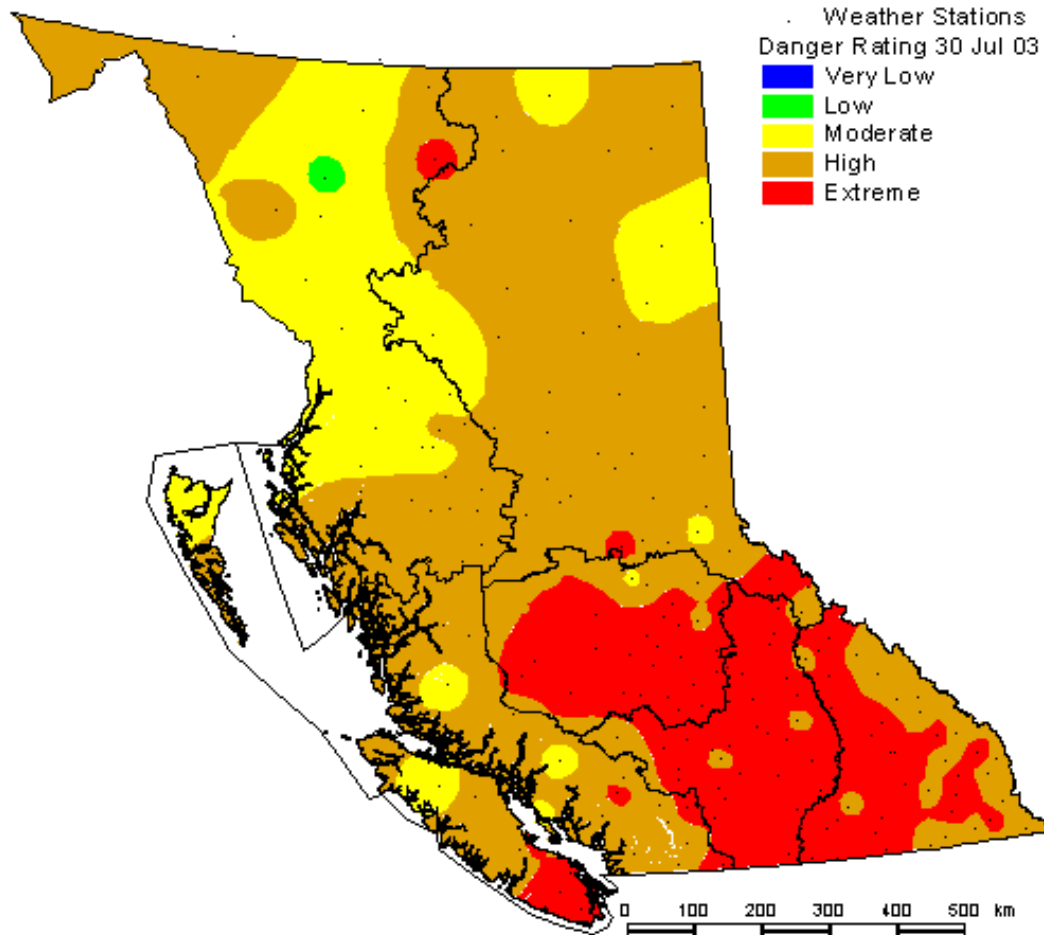
Firestorm 2003

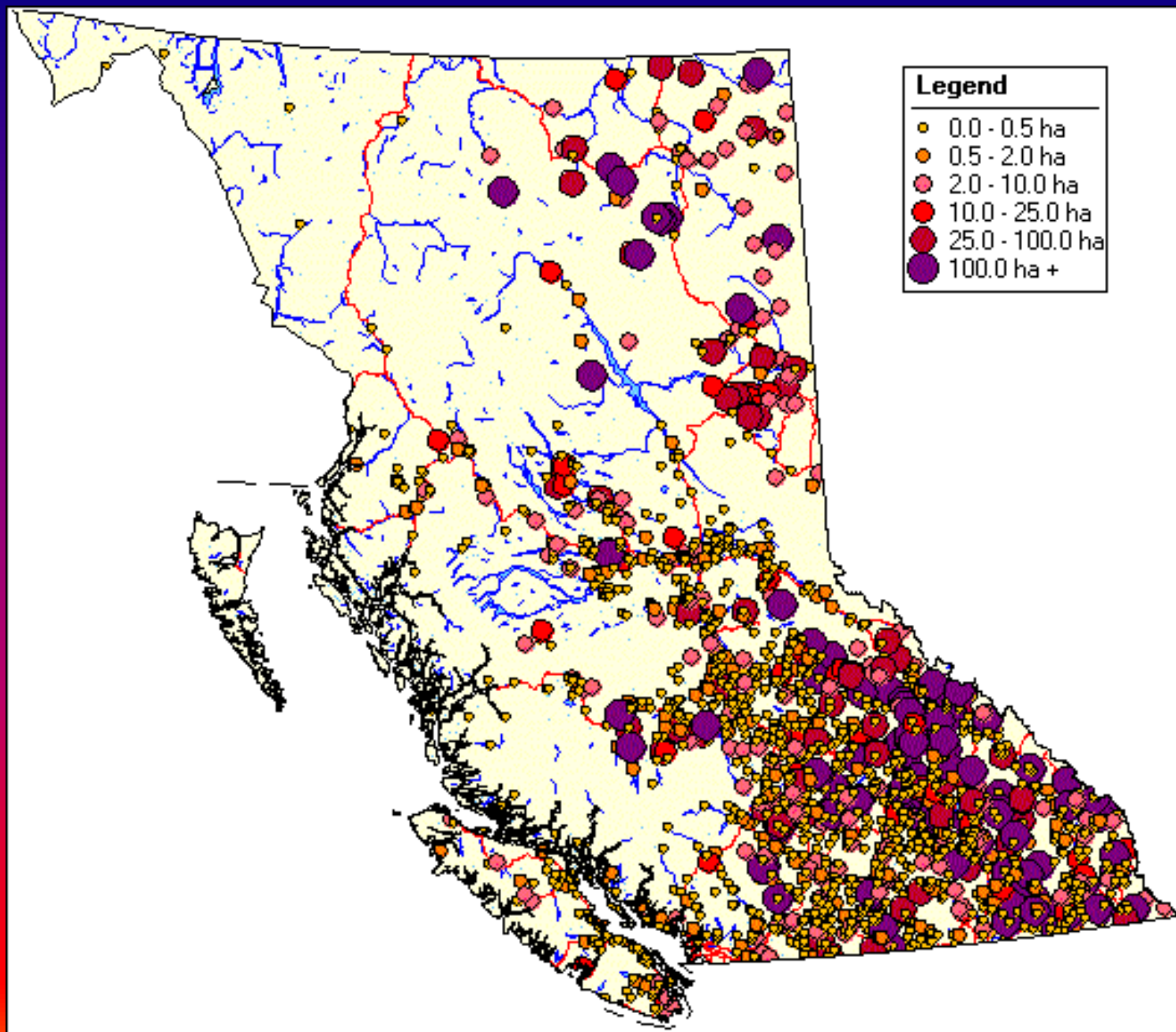
British Columbia Forest Protection

Weather Stations
1300 PDT

Weather Stations
Danger Rating 30 Jul 03

Very Low
Low
Moderate
High
Extreme





Firestorm 2003 Impacts

- Approximately 2,500 wildland fires
- 657,000 acres burned
- 37 interface fires in total
- 22 significant interface fires
- Some over 61,000 acres
- 334 homes destroyed -10 businesses
- > 50,000 people evacuated
- Additional 50,000 on evacuation notice

Firestorm 2003 Impacts

- Emergency Management/structural firefighting over \$100 M
- Forest fire fighting over \$370 M
- Total costs estimated at \$700 M
- Provincial State of Emergency - 6 weeks
- Fire risk across the province continued into late September



Courtesy: Thompson Nicola Regional District



Courtesy: Thompson Nicola Regional District





Courtesy: Thompson Nicola Regional District

AUG 5 2003















Firestorm 2003 - Personnel

- 1300 structural firefighters
- 7600 MOF wildland firefighters
- 3150 out-of-province firefighters
- > 2000 military personnel
- Thousands of other public sector local, regional, provincial and federal personnel, including government, health authorities, etc.
- Thousands of private sector support employees
- > 10,000 volunteers















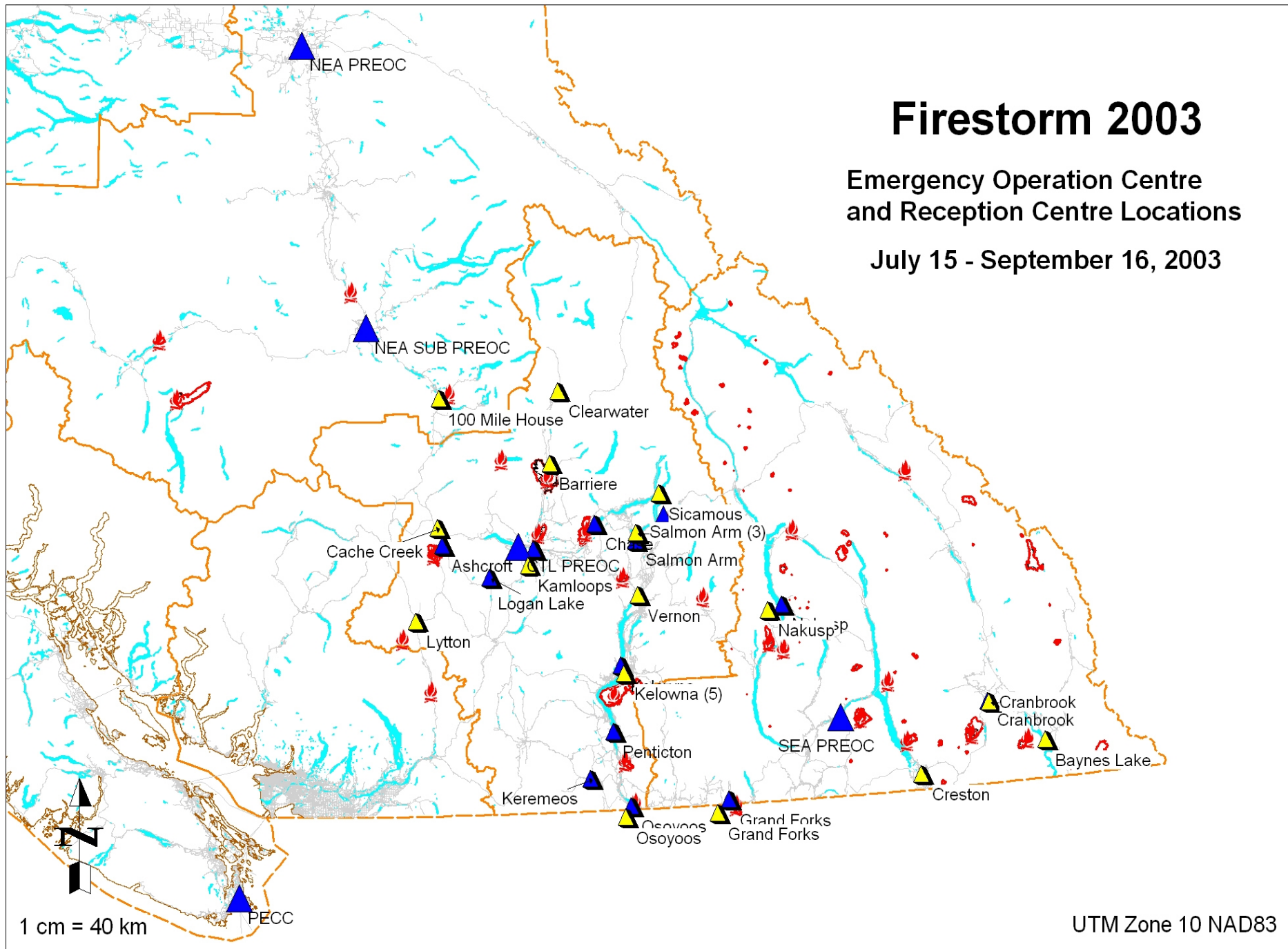




Firestorm 2003

Emergency Operation Centre
and Reception Centre Locations

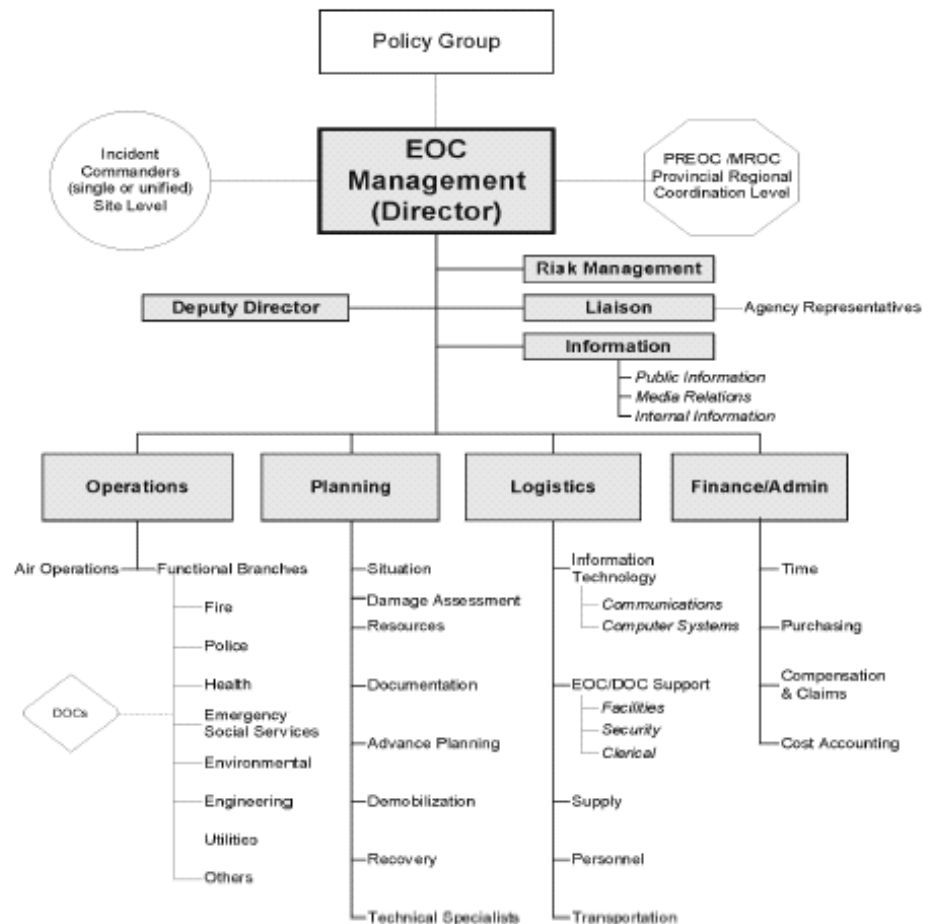
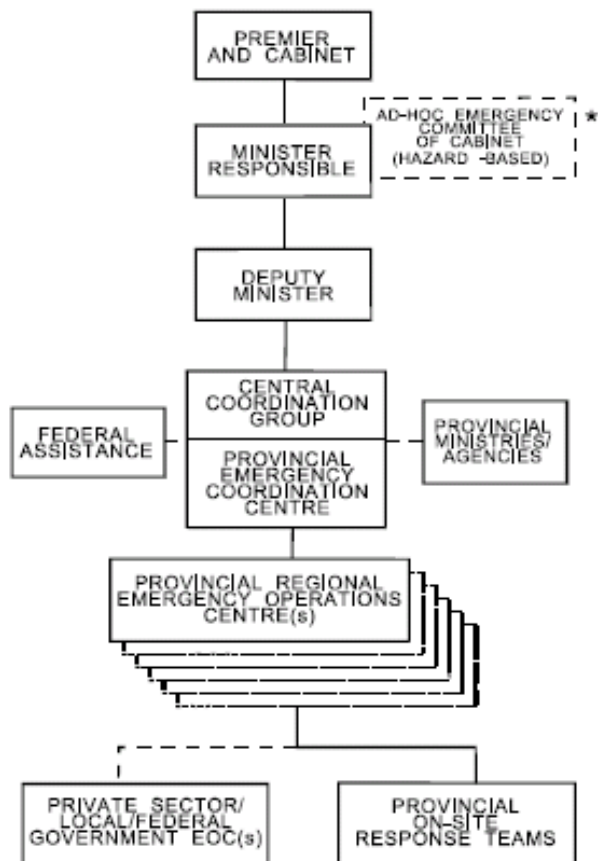
July 15 - September 16, 2003



Local, Regional and Provincial EOCs



BRITISH COLUMBIA EMERGENCY MANAGEMENT STRUCTURE



Critical Communications Applications

Two-way Radio

- Intra and interagency communication
- Tactical operations
- Requesting assistance
- Coordination of on-site response and evacuations
- Initial damage assessment
- Emergency social services

Critical Communications Applications

Voice Telephone

- Intra and interagency communication
- Initial assessment reports
- Requesting assistance
- Conferencing
 - Regional daily briefings
 - Strategic planning among key stakeholders
- Public information call centres

Critical Communications Applications

Fax

- Declarations of emergencies
- Evacuation alerts and orders
- All clears
- Media releases
- Contact lists
- Authorizing or requesting authorization
- Maps
- Situation reports
- Purchase orders

Critical Communications Applications

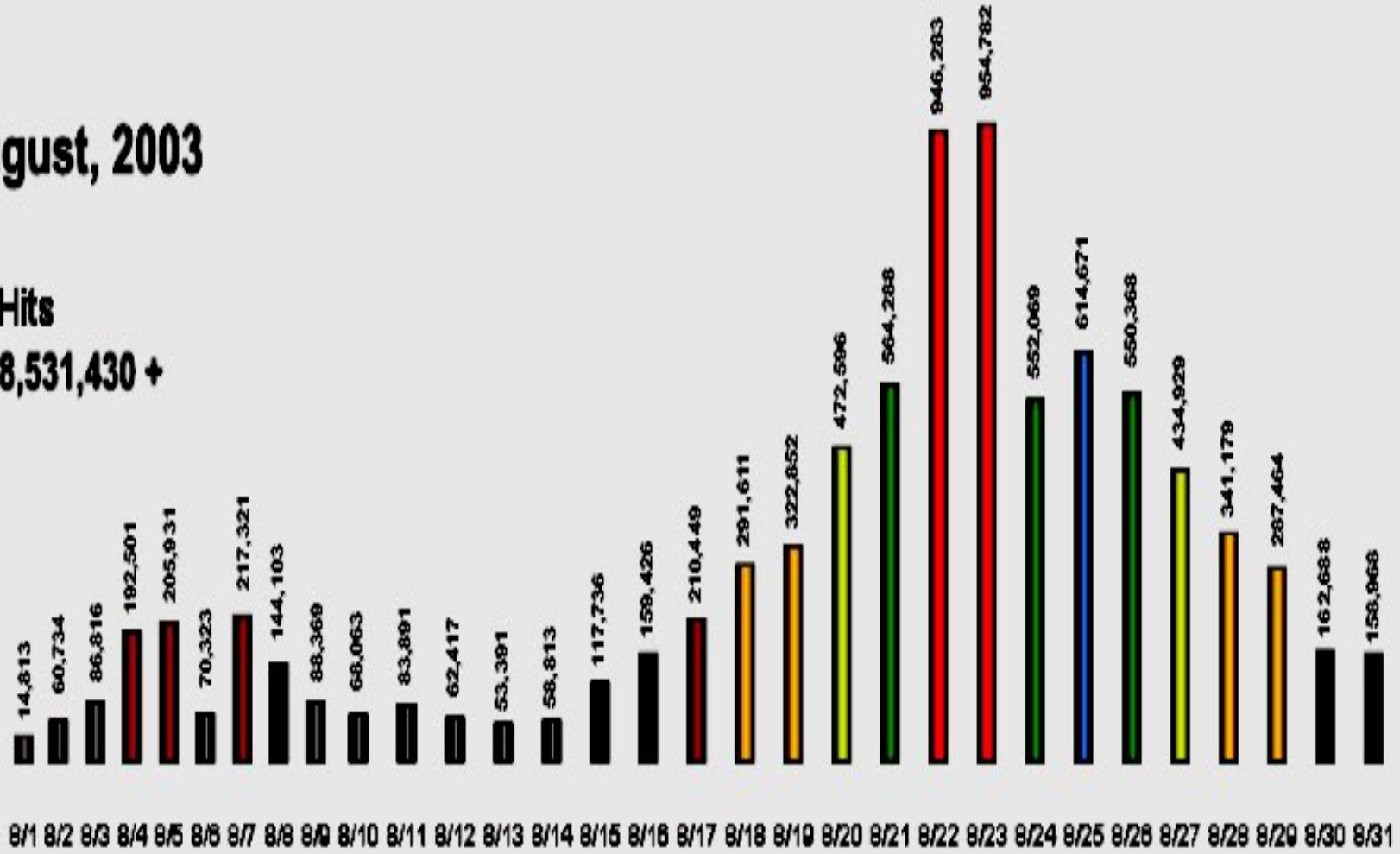
Internet

- Electronic mail
 - Media releases
 - Contact lists
 - File exchange
 - Information queries
 - Situation reports
 - Coordination & integration
- VOIP
- Web-based
 - Real-time weather info
 - Maps
 - Strategic information
 - Background research
 - Webcasts of briefings
 - Public emergency websites

August, 2003

Hits

8,531,430 +



Critical Communications Applications

Broadcasting to Public

- Declarations of emergencies
- Evacuation alerts and orders
- All clears
- Media releases
- Reception centre information
- Self-help information
- Fund raising

Impacts during Firestorm 2003

- Copper and fibre cable damage
- Loss of PSTN service in adjacent communities
- Network congestion, especially during public evacuations
- Internet worm attack
- Eastern North America power blackout
- Loss of mains power
- Lack of backup communications provisions in communities

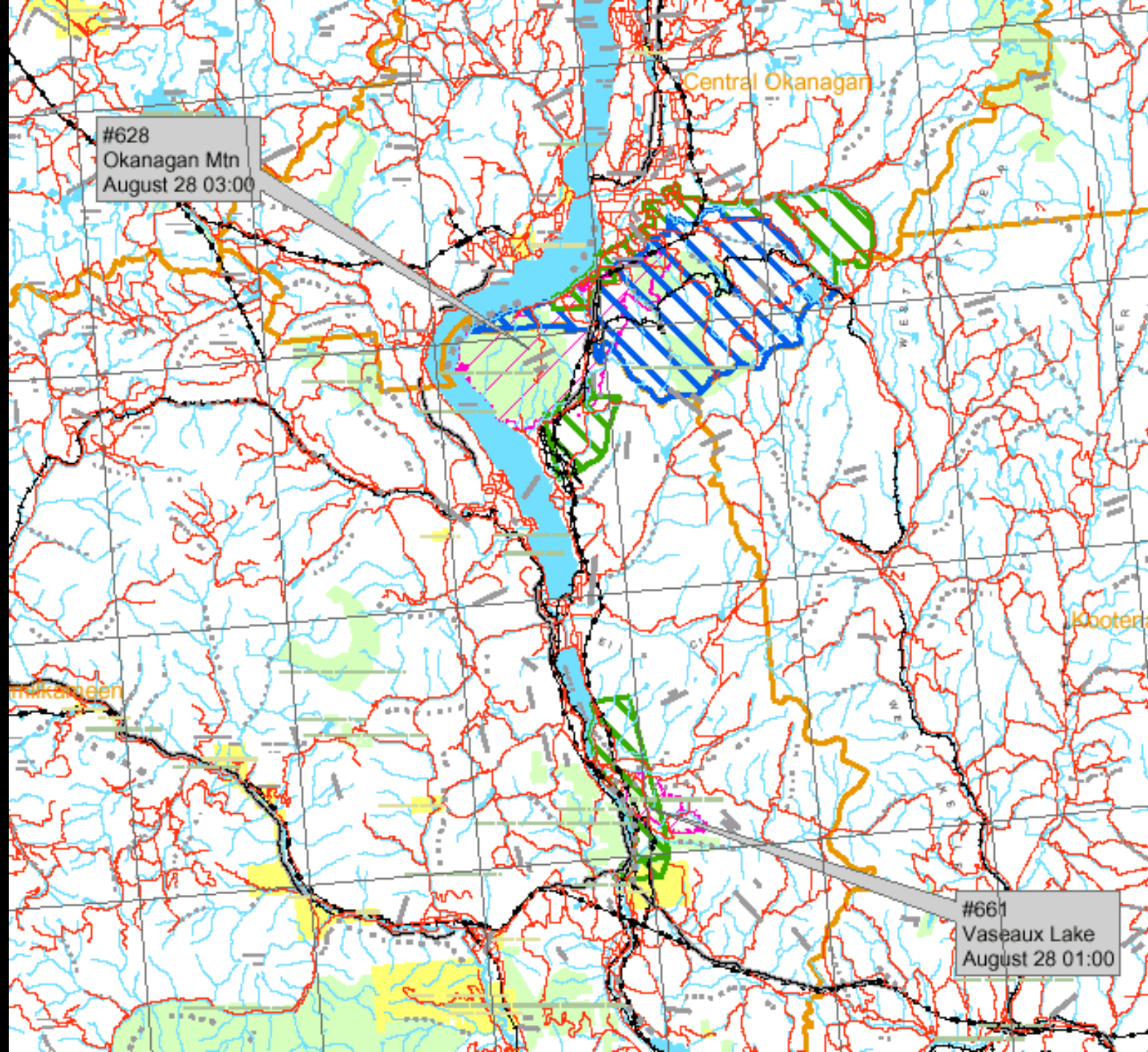


Courtesy: Thompson Nicola Regional District



Courtesy: BC Hydro

Mountain Top Radio Facilities Hidden Risks



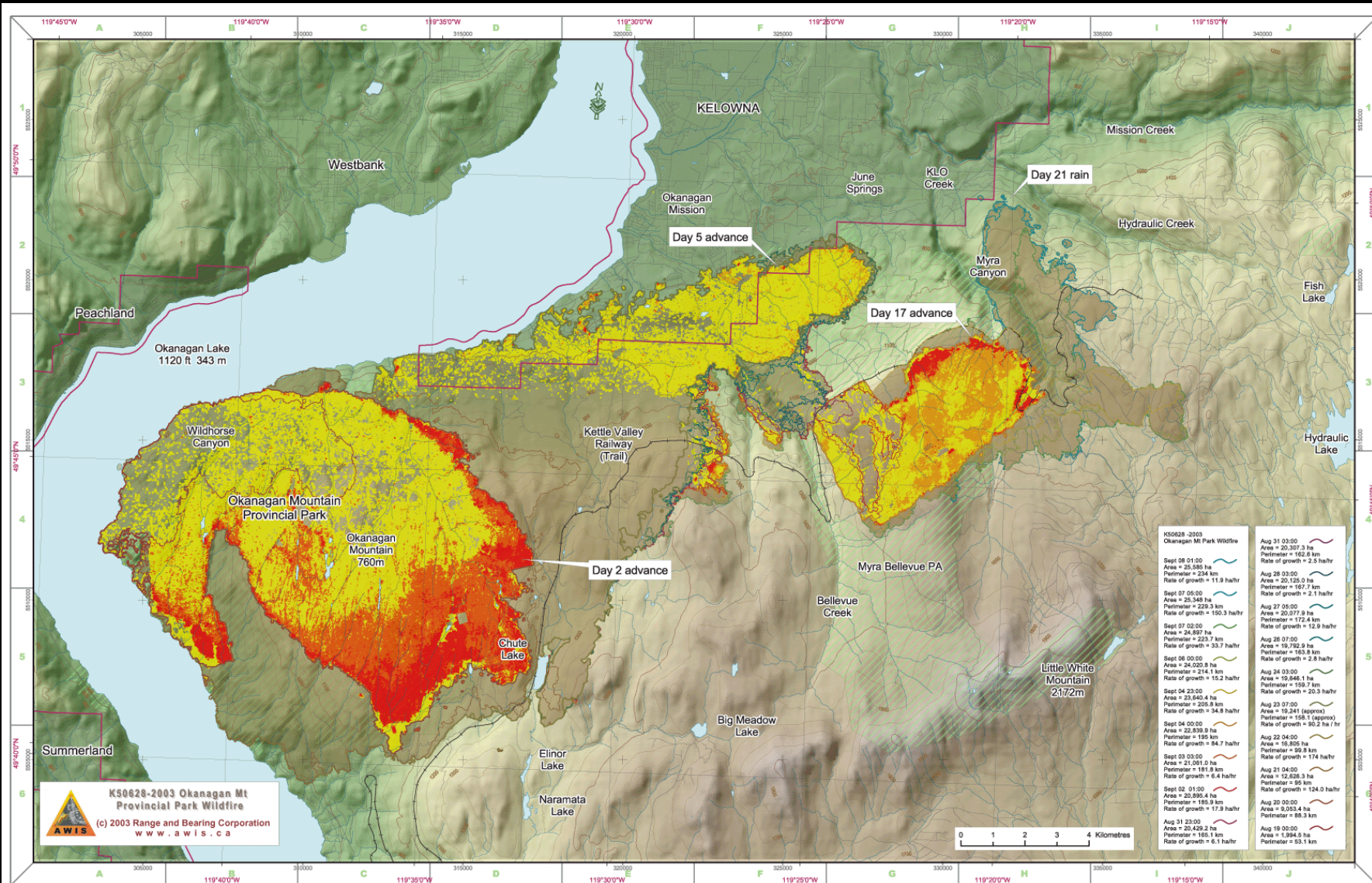




Photo: Mark Franklin





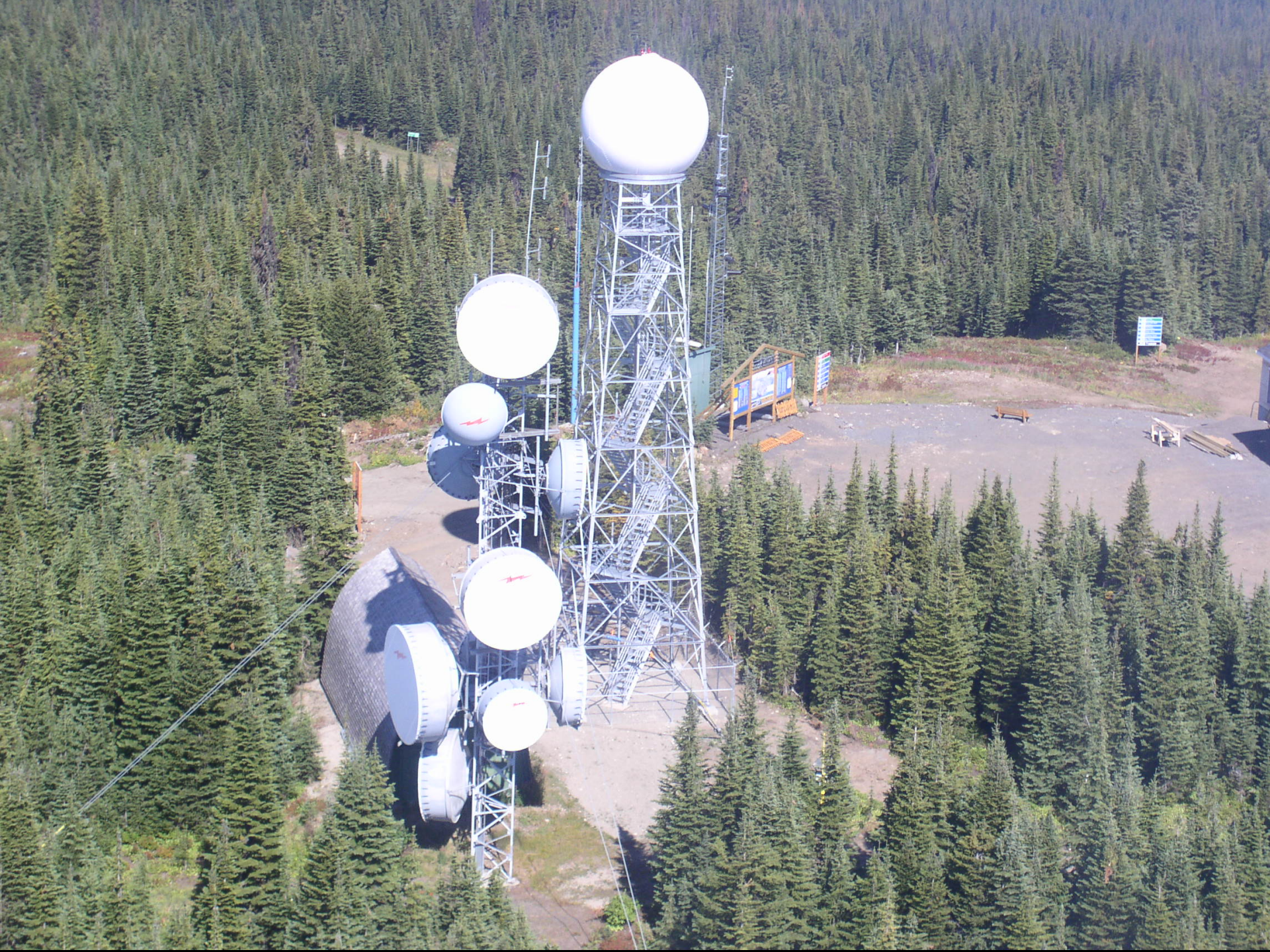
















Mitigation challenges - during fire events

- On-site clearing - widespread bans on backwoods access required special exemptions and fire suppression crew to supervise clearing
- Loss of mains power to sites
- Site access difficulties for damage assessment or backup generator fuel re-supply

SFU R&D - Post 2003

Advanced Mobile Emergency
Communications Prototype (AMECom)



Features

- 20 KW diesel generator
- Large UPS
- 220 and 110 VAC external power outlets
- Interior and exterior Ethernet and telephone patch panels
- Fax/printer
- Flatbed scanner
- Audio amplifier and speakers
- VCR/DVD player/record unit
- LCD TV

Features

- Fixed Iridium satellite phone unit and antenna
- Iridium portable phone unit
- Fixed Globalstar satellite phone unit
- Globalstar hands free satellite phone unit
- MSAT mobile satellite unit with telular phone and fax adapters
- Fixed cellular phone unit
- Fixed cellular data modems and antennas
- Motorola VHF and UHF mobile radio units
- Amateur radio VHF/UHF/HF radio transceiver
- Raytheon JPS ACU 1000 interoperability unit
- In-cab IP, satphone and VHF/UHF

Features

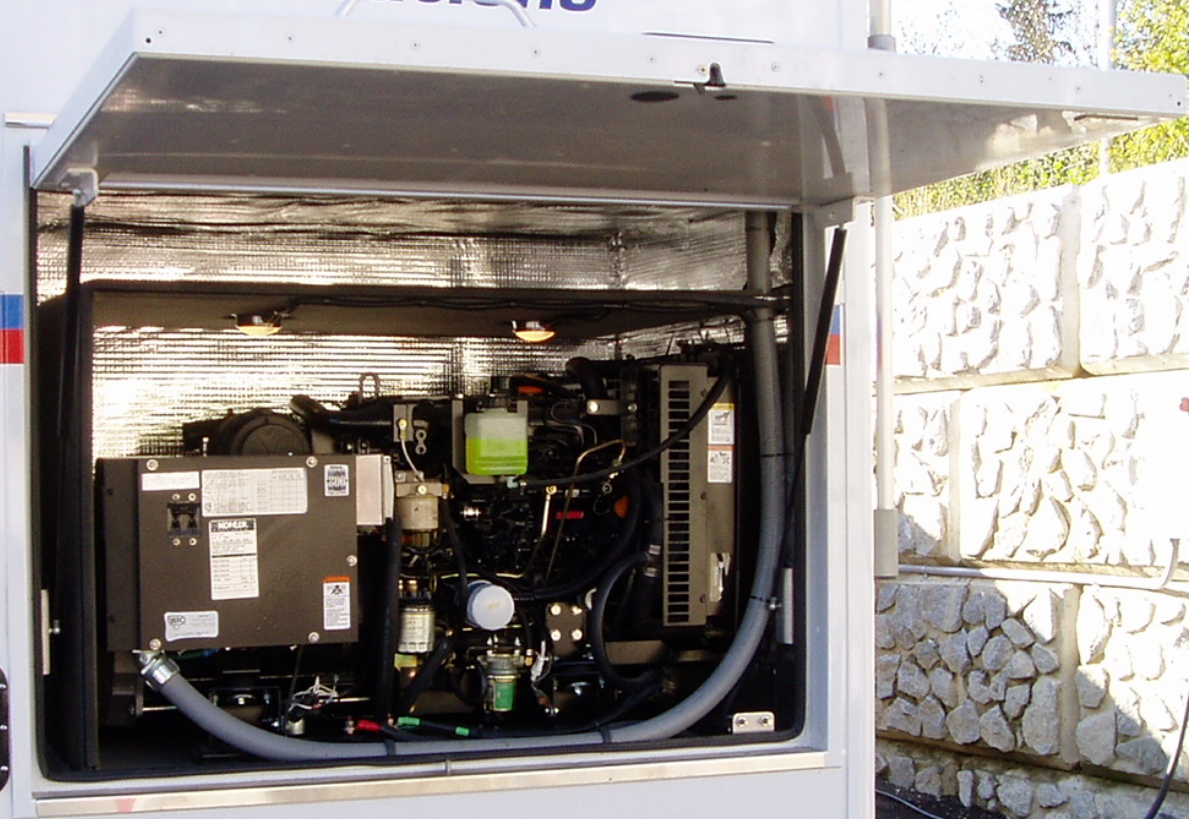
- Self aligning satellite dish for two-way Internet access
- High Speed Internet satellite modem
- 30 foot telescopic mast
- Remote camera
- 2.4 and 5.8 GHz broadband Internet radios for extending links up to 30 Km
- 802.11 wireless access points for local wireless connections (linked to satcom or terrestrial connections)

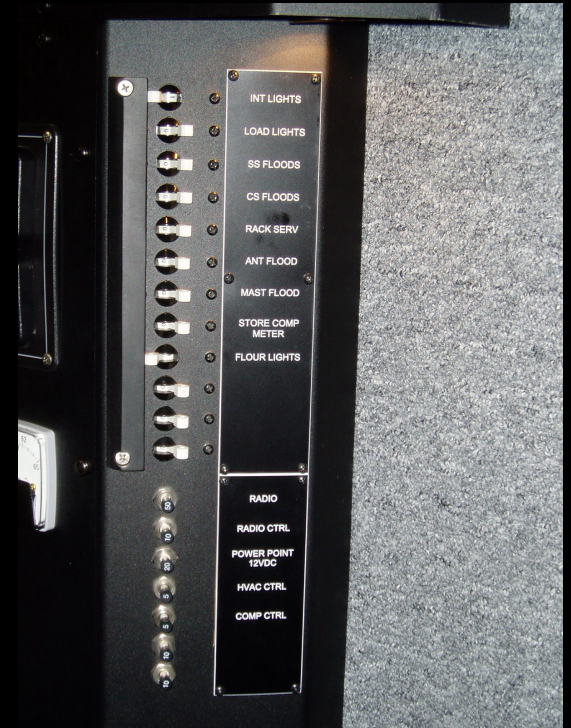
Features

- Mitel 3340 telephone switch, including Voice over IP phone server and accessory unit that can connect to local phone network, satellite telephone units and/or SFU PBX via Internet
- Windows XP workstation
- Windows 2003 server
- Linux server unit
- SUN X1 unix server unit
- GPS units

Emergency Communications

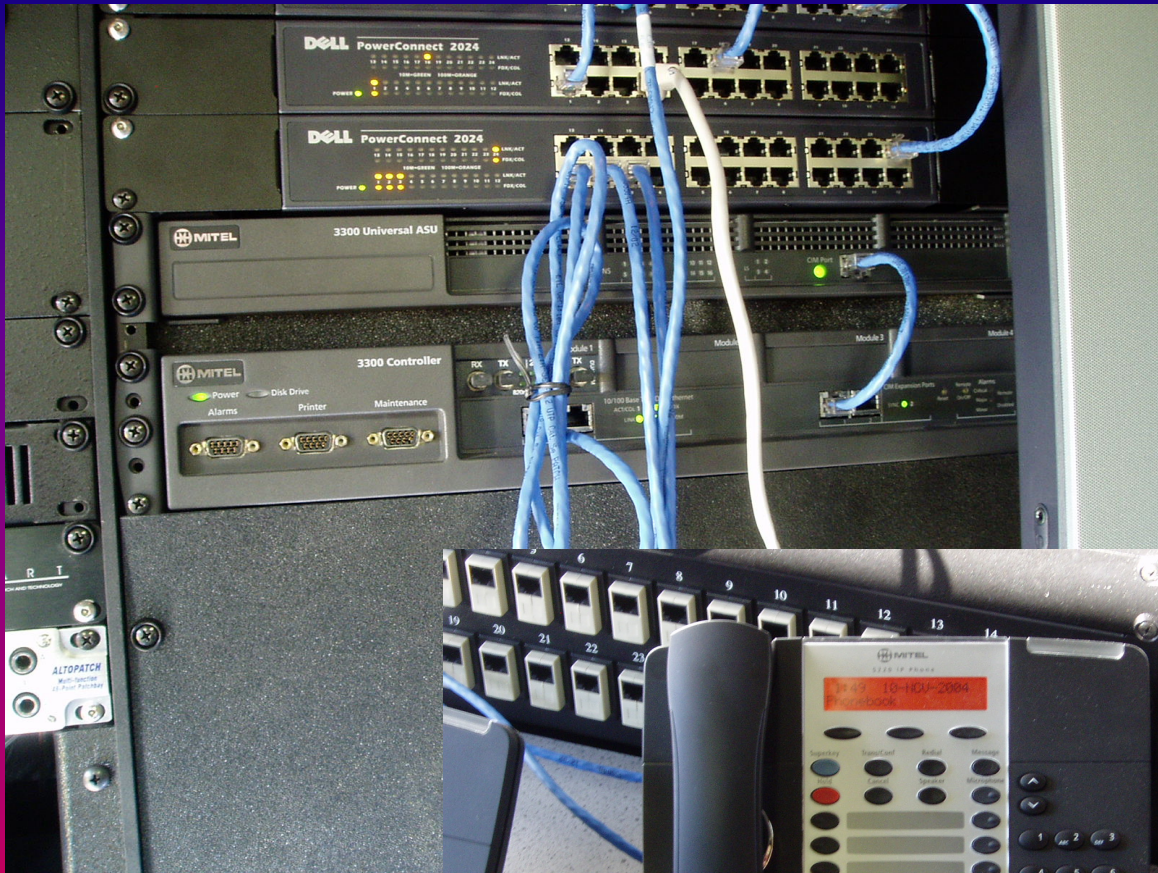
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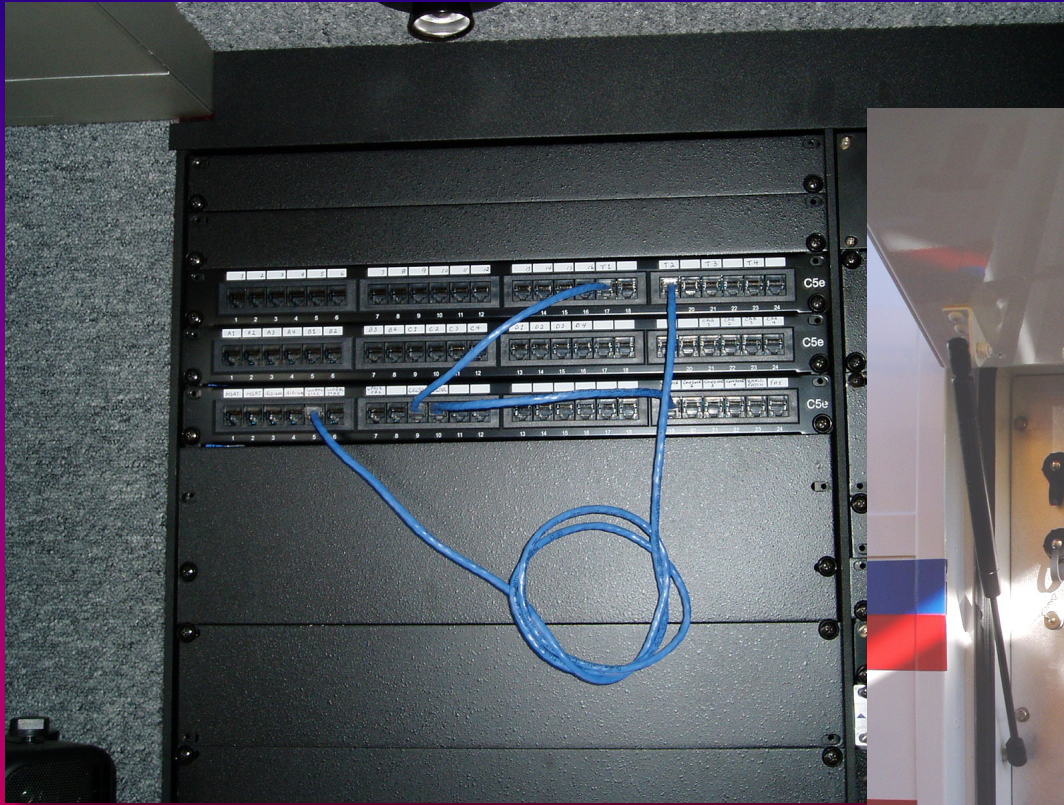














AMEC

Advanced Mobile
Emergency Communications

Technics Res

SIMON
FRASER
UNIVERSITY

GVW 11,804kg





SFU Satellite Emergency Telecommunications Gateway





Web Camera

SFU TRL AMEC MASTCAM Fri Aug 20 12:14:52 2004







PAVILION BALLROOM

AMEC

Advanced Mobile Emergency Communications

Telematics Research Lab

Applying Disaster Communications Concepts to Space Travel









Global Communication



Key Partnerships

Public Sector

- Communications Research Centre
- Industry Canada
- PSEPC
- BC Provincial Emergency Program

Private Sector

- Wi-LAN Inc.
- Telesat Canada
- Mobile Satellite Ventures (MSAT)
- EMS Technologies
- Ralph's Radio
- Wolf Coach

Key Funding Sources

Private Sector

- Wi-LAN Inc. (in-kind)
- Telesat Canada (in-kind)
- Mobile Satellite Ventures (MSAT) (in-kind)
- SUN Microsystems (in-kind)

International

- NATO
- European Space Agency

NGO

- SETI Institute

Public Sector

- Canada Foundation for Innovation
- BC Knowledge Development Fund
- Communications Research Centre (in-kind)
- Industry Canada
- OCIEPEP
- Canadian Space Agency
- Western Economic Diversification Canada
- SSHRC

